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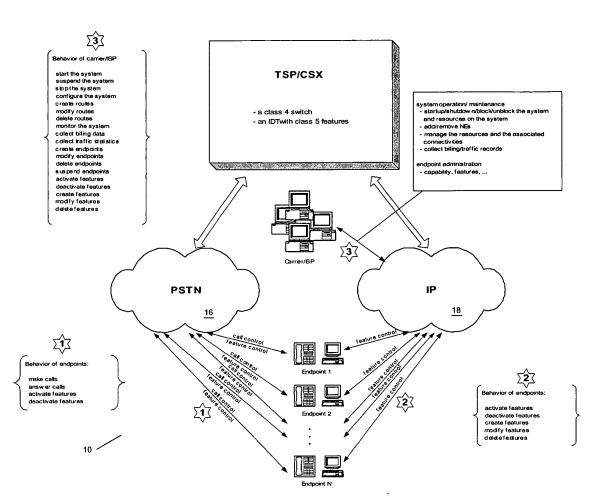


Figure 2

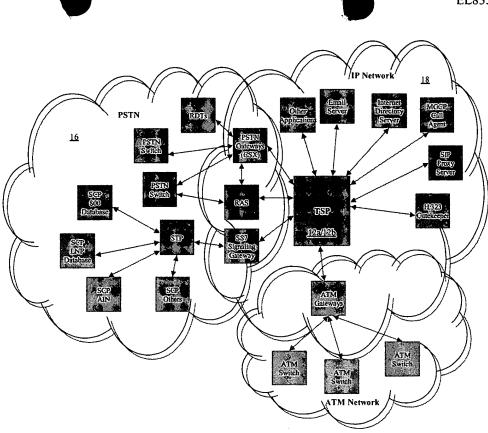


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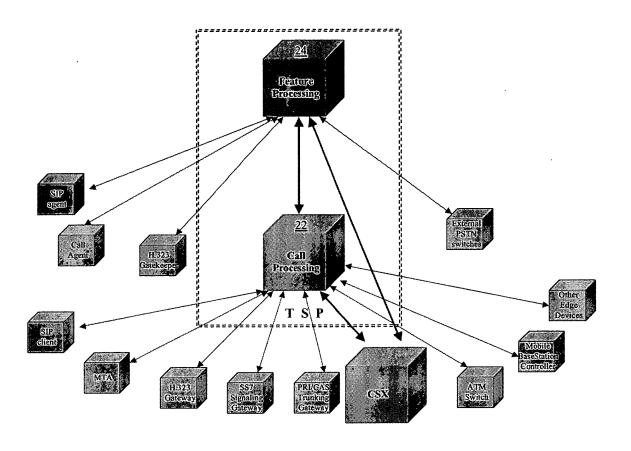


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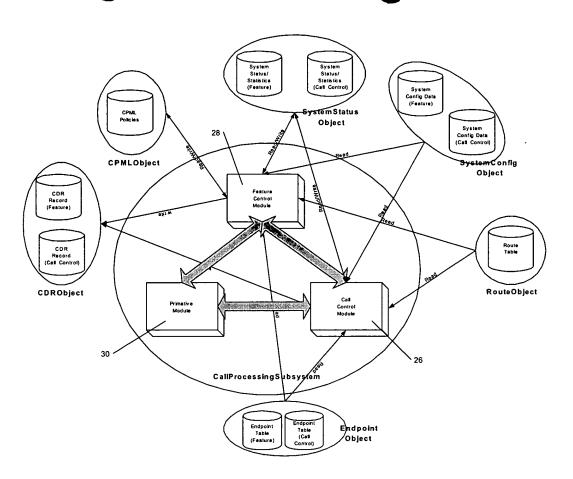


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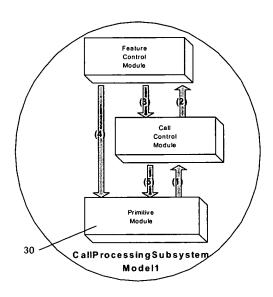


Figure 6A

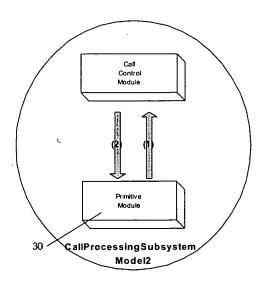


Figure 6B

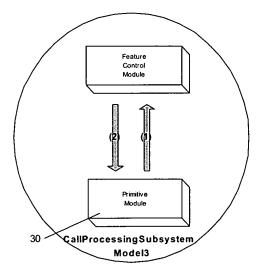


Figure 6C

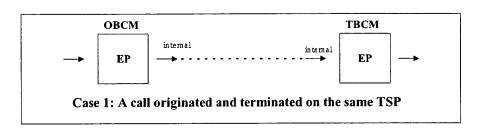


Figure 7A

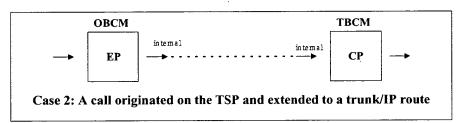


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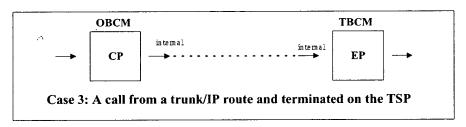


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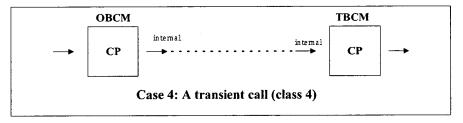


Figure 7D

	Feature Mask	Feature Logic Object
	000	NULL
	001	CND_FLO
	010	CFBL_FLO
	011	CFBL_FLO
	100	CW_FLO
	101	CW_CND_FLO
	110	CW_CFBL_FLO
30A	111	CW_CFBL_CND_FLO

feature mask = abc where

bit a - Call Waiting (CW)

bit b - Call Forwarding Busy Line (CFBL)

bit c – Calling Number Delivery (CND)

User defined features are not included in this table.

Figure 8

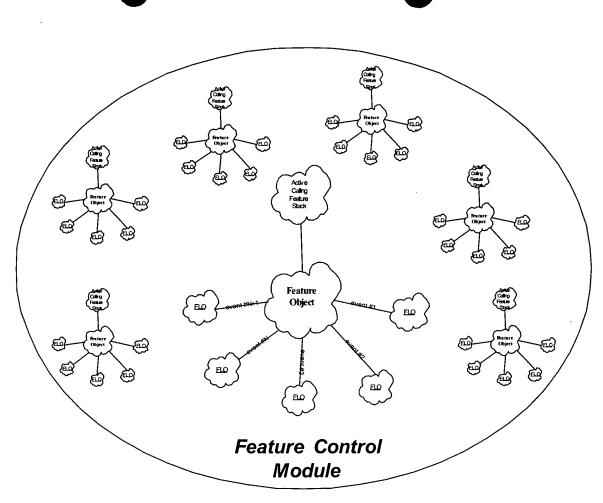


Figure 9

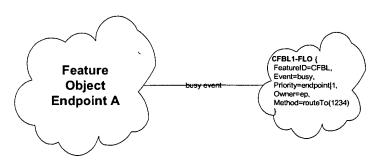


Figure 10A

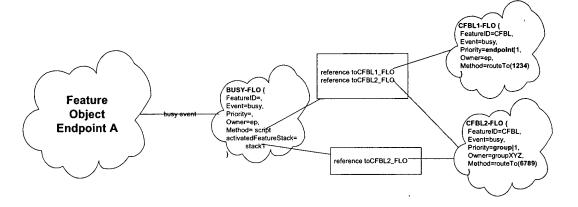


Figure 10B

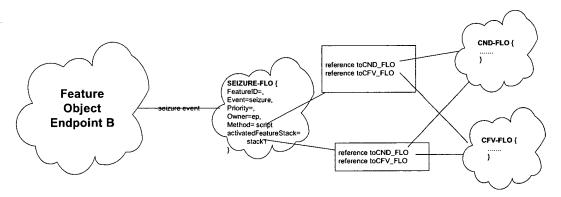


Figure 10C

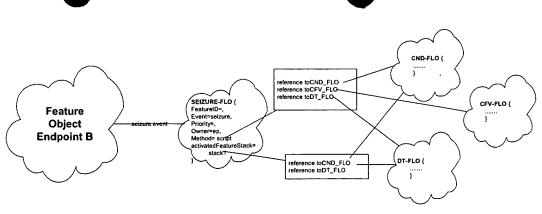


Figure 10D

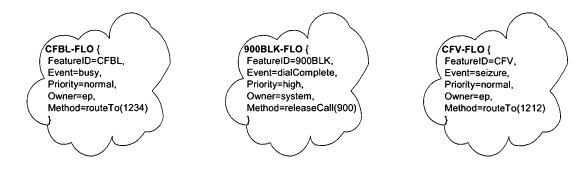


Figure 11A

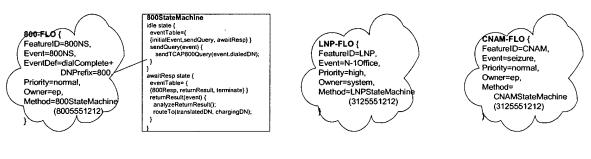


Figure 11B

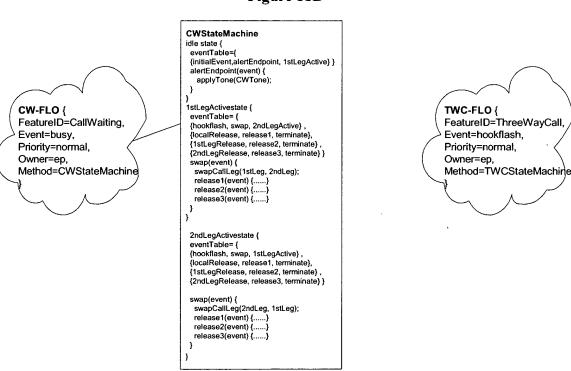


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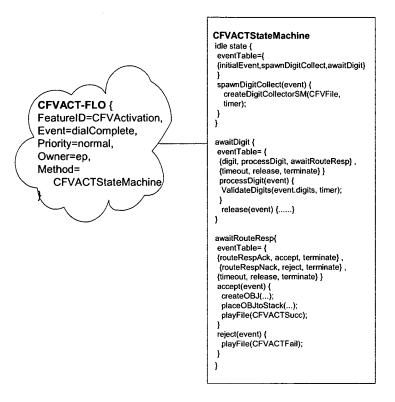


Figure 11D

)

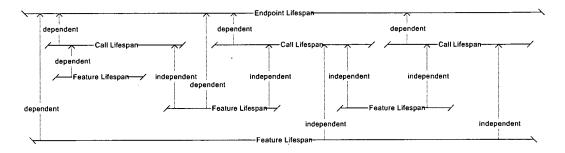


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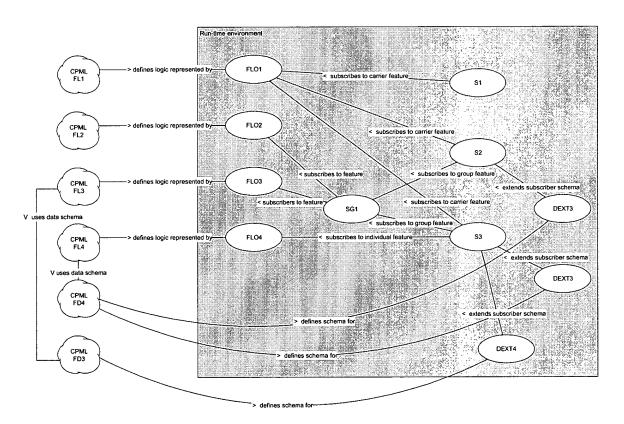


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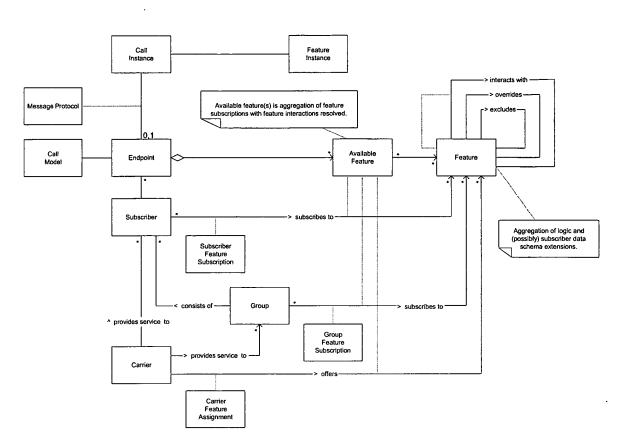


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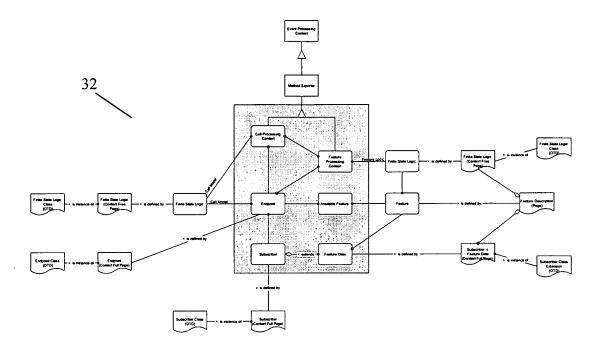


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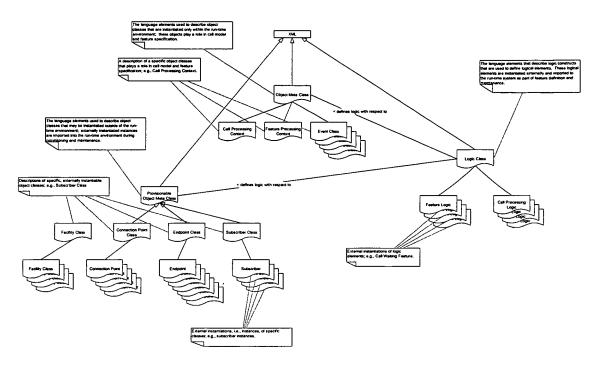


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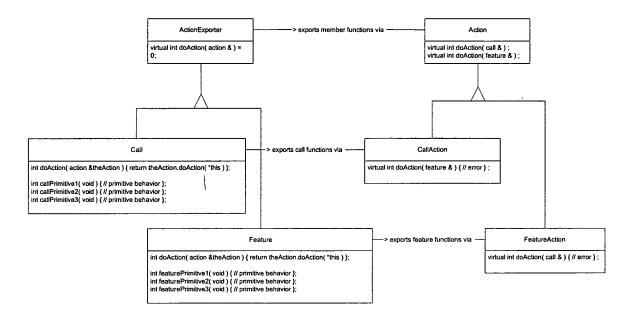


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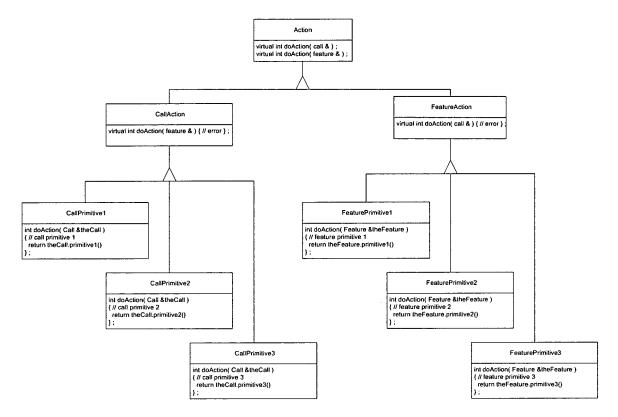


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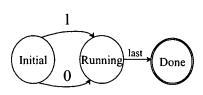


Figure 19

```
(LogicName
(StateName
         (EventName
             ((Predicate)
                  (ActionName ())
(ActionName (ParamSpec,..))
                  (StateName)
             (() (ActionName (ParamSpec,..))
(ActionName (ParamSpec,..))
                   (StateName)
         (EventName
             ((Predicate)
                 (ActionName (ParamSpec,..))
(ActionName (ParamSpec,..))
                  (StateName)
             (() (ActionName (ParamSpec,..))
(ActionName (ParamSpec,..))
                   (StateName)
          )
    (StateName
         (EventName
            ((Predicate)
(ActionName (ParamSpec,..))
(ActionName (ParamSpec,..))
                 (StateName)
```

Figure 20

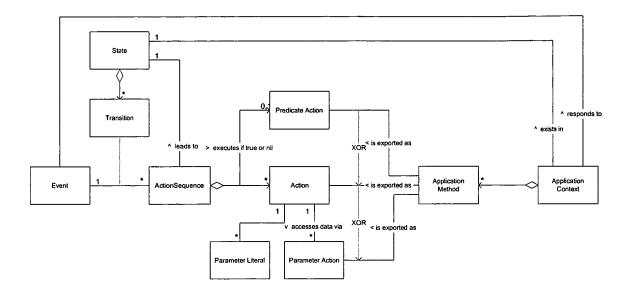


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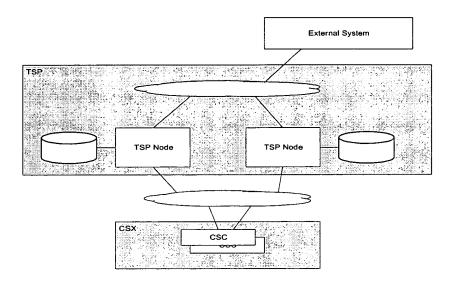


Figure 22

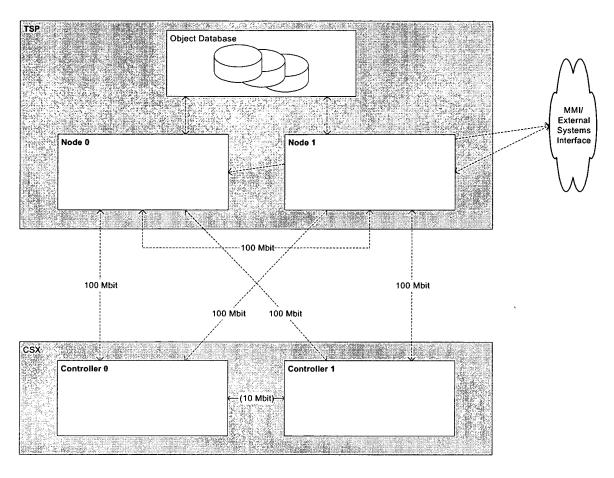


Figure 23

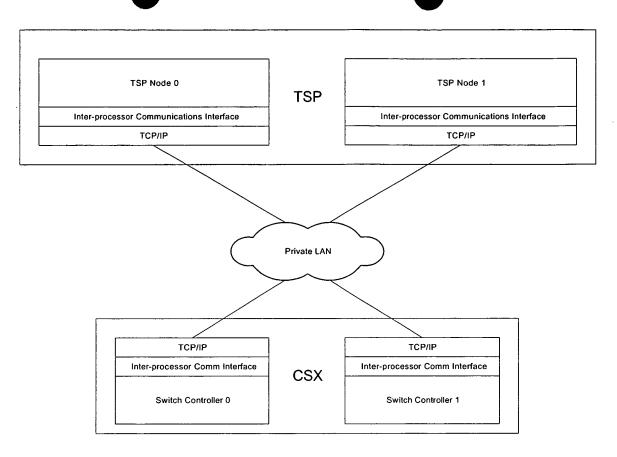


Figure 24

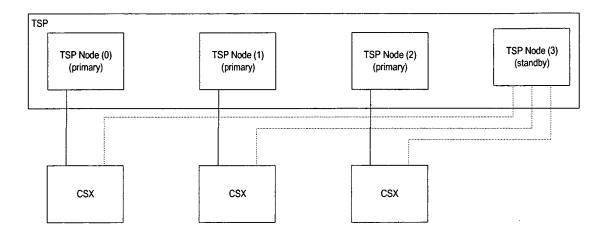


Figure 25

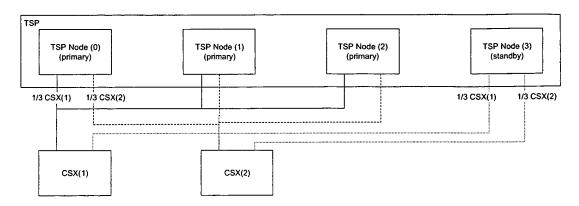


Figure 26

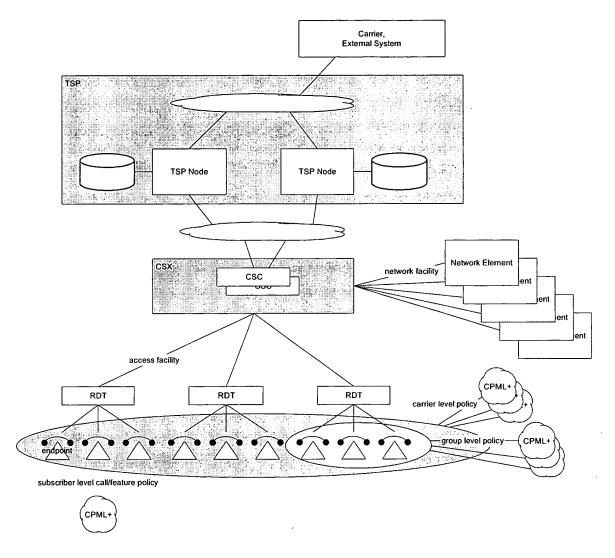


Figure 27

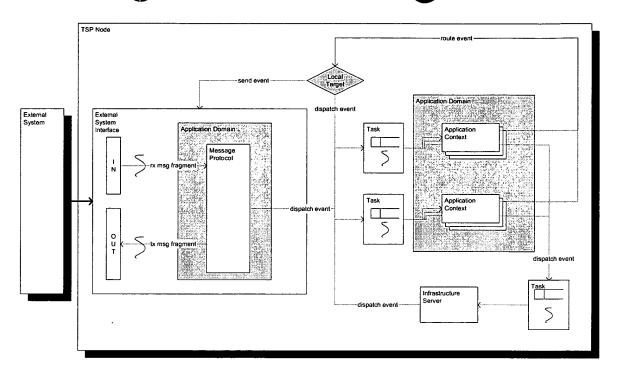


Figure 28A

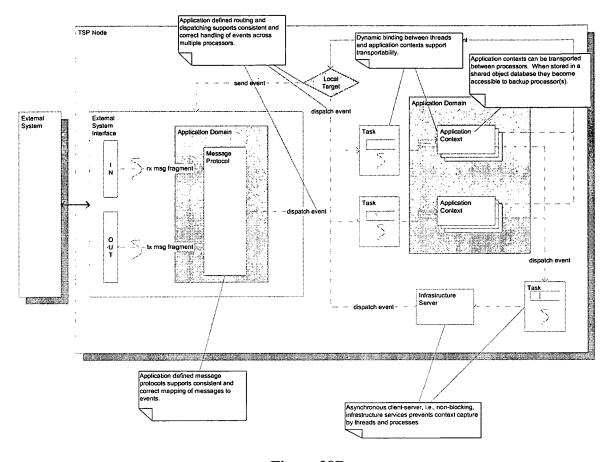


Figure 28B

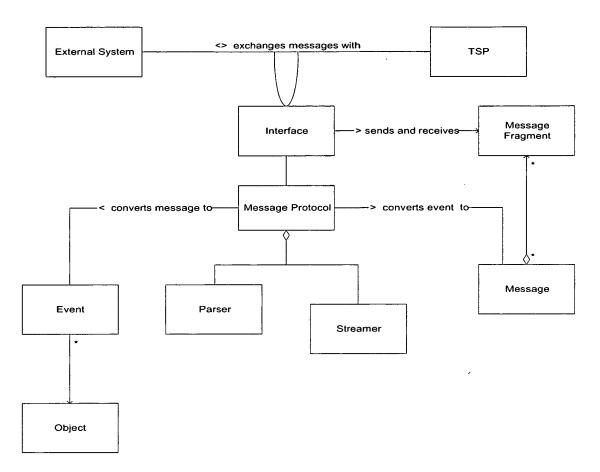


Figure 29

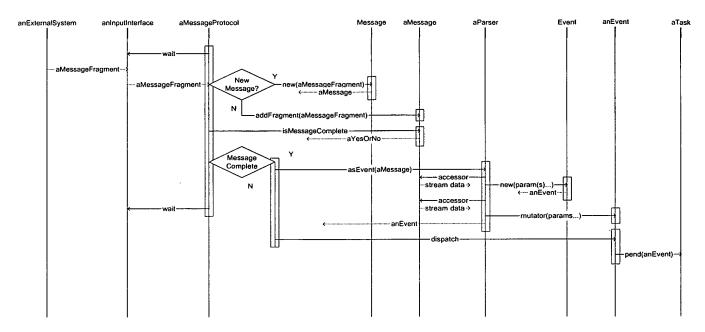


Figure 30A

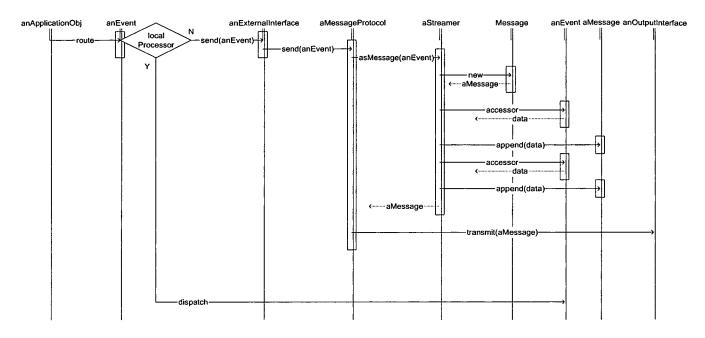


Figure 30B

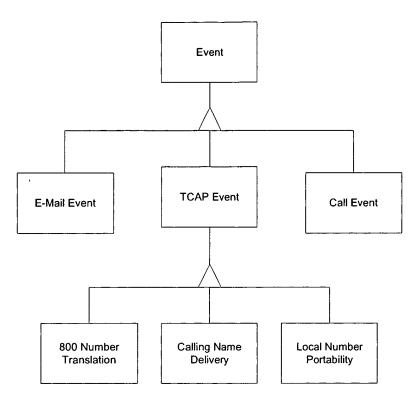


Figure 31

## Call/Feature Policy

Definition	Describes call and feature processing behavior.
Native Format	ASCII based markup (CPML, CPML+) for external usage and
	maintenance.
	Object(s) for internal processing.
Source/Authority	Service maintenance and provisioning; the TSP/CSX product provides
	standardized call and class 5 feature definitions.
	Service Creation Environment (tool?) provides capability to create
	new or modify existing call and/or feature policies.
Value Initiation Frequency (Low)	Assuming that most polices are defined at carrier or group levels, new
_	call and feature policies with the introduction of new group level call
	and features types. This frequency is less than the subscriber
	provisioning frequency.
	For individual level call and feature types, call and feature policies
	may be introduced coincident with the provisioning of new
	subscribers.
Value Change Frequency (Low to	In general, call and feature logic elements change infrequently—when
Moderate)	call or feature logic is modified or upgraded. This frequency is less
	than the subscriber provisioning frequency.
	Call and feature parameter elements, e.g., call forwarding destination
	number, may change at or above the subscriber provisioning
	frequency. Some parameter elements may change as much as hourly.
Value Access Frequency (High)	Call and feature policies, including logic and parameter elements, are
	accessed with each call.
Schema Change Frequency (Low)	Call and feature policy schemas define the structure with which calls
	and call features are described. Once mature, the schema for defining
	calls and features should change very infrequently; only as often as
	needed to upgrade call type and feature specification capabilities.
Consumer(s)	Call and feature processing.
Consumer Format	Object(s)
Replications and Sharing	TSP nodes share call and feature processing specifications.
Scope	System, Group, and Individual Subscriber
Volume	Group and system level logic elements have few instances.
	Individual level logic elements are coincident with subscriber
	volumes.
	Parameter element volumes are a function of the number of
	parameterized features in combination with the subscriber population
	size.

Figure 32A

## Route

Definition	Describes transmission paths between a network element and its associated endpoints and other network elements and the characteristics of those paths.
Native Format	
Source/Authority	OAM&P
Value Initiation Frequency (Low)	New route entities are introduced when new transmission paths are provisioned and when new transmission path characteristics are provisioned.
Value Change Frequency (Low)	Since routes are related to physical equipment and transmission facilities, routes are relatively static.
Value Access Frequency (High)	Route data is accessed for each call.
Schema Change Frequency (Low)	
Consumer(s)	Call processing.
Consumer Format	
Replications and Sharing	Multiple TSP nodes share route data entities.
Scope	
Volume	Route volumes are a function of the count of endpoints, associated network elements, and transmission path characteristics.

Figure 32B

Endpoint/Subscriber

Definition	Describes endpoint devices (within scope of TSP/CSX), the
	configuration of those devices, subscribers associated with endpoint
	devices, and associates endpoint(s)/subscriber(s) with call and feature
	policies.
Native Format	
Source/Authority	Subscriber care (subscriber provisioning and maintenance).
Value Initiation Frequency (Low)	Endpoint/subscriber instances are initiated as new subscribers are
	added to the carrier's subscriber base.
	Call and feature policy associations are initiated as new call types and
	features are deployed and as subscribers subscriber to different
	services.
Value Change Frequency (Low)	Value changes occur as subscribers modify their calling and/or feature
	parameters.
Value Access Frequency (High)	Endpoint/subscriber data is accessed with each call.
Schema Change Frequency (Low	Endpoint schema changes only with software product upgrades.
to Moderate)	Subscriber schema may be extended through introduction of new
	features.
Consumer(s)	Call and Feature processing.
Consumer Format	Object
Replications and Sharing	Multiple TSP nodes share Endpoint/subscriber data.
Scope	
Volume	Endpoint/subscriber volumes equal the carrier's subscriber
	population.

Figure 32C

## Call/Feature State

Definition	Describes the current state of calls and/or call features.
Native Format	Object
Source/Authority	Call and Feature Processing; call and feature state data is generated
	and maintained for each call and/or feature.
Value Initiation Frequency (High)	Call state instances are initiated with each call.
	Feature state instances are initiated as needed based on call level
	events.
Value Change Frequency (High)	Call and feature state changes occur in response to events throughout
	the life of the associated call and/or feature(s).
Value Access Frequency (High)	Call and feature state are accessed in order to service events
	throughout the life of the associated call and/or feature(s).
Schema Change Frequency (Low)	Call and feature state objects a combination of native application
	objects and instantiations of call and feature policy schemas.
	Native object schemas change only with product software upgrades.
	Call and feature policy schema changes are addressed elsewhere.
Consumer(s)	Call and feature processing.
Consumer Format	Object
Replications and Sharing	Call and feature states are replicated in support of fault tolerance
	capabilities.
Scope	
Volume	Call and feature volumes are a function of the subscriber population
	combined with the subscriber's calling frequency constrained by
	transmission capabilities.

Figure 32D

Equipment/Facility Describes an equipment item or a transmission facility, and the Definition configuration of that equipment item or transmission facility. Equipment items include processor devices, remote data terminals, intelligent peripherals, etc. Transmission facilities include network facilities, which connect a CSX to an external network element, and access facilities, which provide endpoints with access to the carrier's network. MIB? Native Format Source/Authority OAM&P Value Initiation Frequency (Low) New equipment descriptions are introduced when the carrier adds new equipment components. New network facilities are introduced when the carrier adds new transmission facilities. Value Change Frequency (Low) Changes in equipment and transmission facility descriptions and configurations are rare once provisioned and stable. Equipment and transmission facility descriptions and configurations Value Access Frequency (Low) are accessed only during system initialization and re-boots. Schema Change Frequency (Low) Equipment and transmission facility schemas change only support for new equipment and/or transmission types is added to the product. Consumer(s) System initialization and OA&P processes. Consumer Format TSP nodes share some of the equipment and transmission facility Replications and Sharing description and configuration data. TSP and CSX elements share certain categories of equipment and transmission facility descriptions and configurations. Scope Volume This is a function of the count of equipment items and transmission

Figure 32E

facilities.

**Equipment/Facility State** 

Describes the present state of an equipment item or a transmission
facility.
MIB?
OA&M processes, certain aspects of call processing.
NMS may command state changes.
Equipment and facility states are initiated during system initialization
and re-boots.
Certain types of equipment and transmission facilities change state
frequently. Other types change state with only moderate frequency.
Aggregate equipment and facility states change with less frequency
than individual components.
In general, this data is accessed at NMS polling intervals.
State data that contributes to statistics may be sampled at frequent
intervals.
Equipment and facility state schemas change only with product
upgrades.
NMS
MIB?
Multiple TSP nodes may share certain state elements.
Certain equipment and facility state elements may be replicated for
redundancy support.
This is a function of the count of equipment items and transmission facilities.

Figure 32F

**Equipment/Facility Statistics** 

	Equipment a well by Statistics
Definition	Describes a usage or event occurrence history with respect to a particular equipment item or facility.
Native Format	MIB?
Source/Authority	OA&M processes, certain aspects of call processing.
Value Initiation Frequency (Low)	Values are initiated during system initialization and re-boots.
Value Change Frequency	Statistics on directly measured attributes change with the frequency of
(Moderate to High)	related events.
_	Statistics on sampled attributes change with the sampling frequency.
Value Access Frequency (Low to	These values are accessed at collection and polling intervals.
Moderate)	
Schema Change Frequency (Low)	Statistic schema changes occur only with product upgrades.
Consumer(s)	NMS, OAM&P
Consumer Format	SNMP Messages, ASCII based markup logs
Replications and Sharing	
Scope	
Volume	Statistics volume is a function of measurement method, measurement intervals, and count of sampled entities.

Figure 32G

**Automated Message Accounting (AMA)** 

Tittomated Message Message (Milliam)		
Definition	Describes call and feature usage characteristics relevant to call and	
	feature billing.	
Native Format	AMA data is packed binary coded decimal.	
	Historically, AMA data is stored and/or transmitted in blocks	
	according to a standard tape record format.	
Source/Authority	Billing related processing; AMA records are generated from CDRs.	
Value Initiation Frequency (Low)	AMA records are most likely generated according to an internal	
	schedule, perhaps once or twice daily.	
	AMA generation may occur on demand when polled by an external	
	system.	
	AMA or as specified by call and/or feature definitions to support real-	
	time bill calculation/accounting.	
Value Change Frequency (Static)	AMA records are static once generated.	
Value Access Frequency (Low)	In general, AMA records are accessed only when passed to an	
	external system for processing—under nominal circumstances this	
	occurs once for each record.	
	Additional accesses may occur to support recovery of an external	
	processing exception.	
Schema Change Frequency (Low)	New AMA schemas may be introduced with new service	
	introductions.	
	Existing AMA record schemas are defined by Telcordia standards and	
	therefore change infrequently.	
Consumer(s)	External bill processing system.	
Consumer Format	AMA	
Replications and Sharing	AMA data need not be replicated or shared among TSP processing	
	nodes.	
Scope	System	
Volume	AMA volumes are a function of call/ feature volume.	

Figure 32H

Call Detail Record (CDR)

Definition	Describes call and feature usage characteristics relevant to call and/or
	feature billing, and facility usage accounting.
Native Format	Log of ASCII based markup.
Source/Authority	Call and Feature Processing; call and feature processing generates
	CDRs according to call and/or feature policy.
Value Initiation Frequency (High)	CDRs are generated per call and per feature.
	There may be multiple CDRs associated with a single call or feature.
Value Change Frequency (Static)	CDRs are static once generated.
Value Access Frequency (Low)	In general, CDRs are accessed as needed to support AMA or other
	billing interface data generation, and as needed to support facility
	usage accounting.
	AMA generation frequency is described elsewhere.
	It is anticipated that other billing formats and facility usage
	accounting data are generated no more often than daily.
Schema Change Frequency	New CDR schemas may be introduced with the introduction of new
(Moderate)	call types and call features.
	Existing CDR schemas may be modified to support billing or facility
	usage accounting changes.
Consumer(s)	Billing and Usage Accounting processes.
Consumer Format	ASCII based markup.
Replications and Sharing	CDR data need not be replicated or shared among TSPs.
Scope	System
Volume	Generally coincident with call and feature volumes.

Figure 32I

1

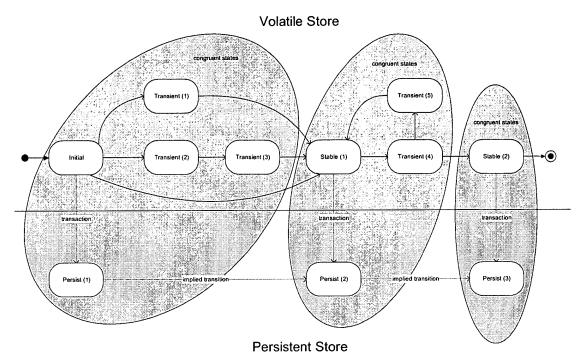
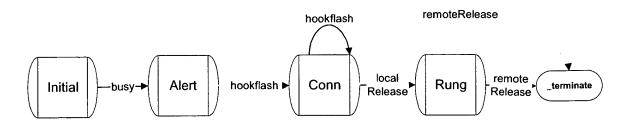


Figure 33

Figure 34



## **Call Waiting State Machine**

Figure 35

100

120

FIGURE 36

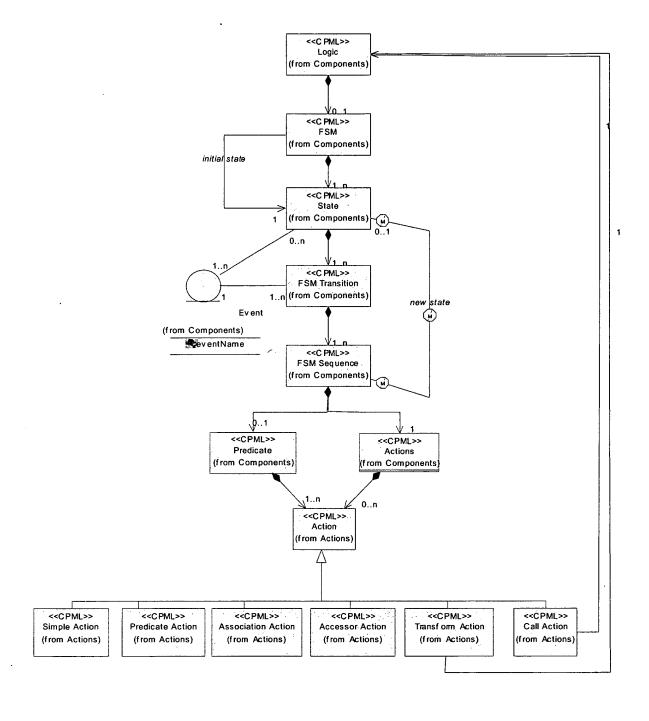


Figure 36A

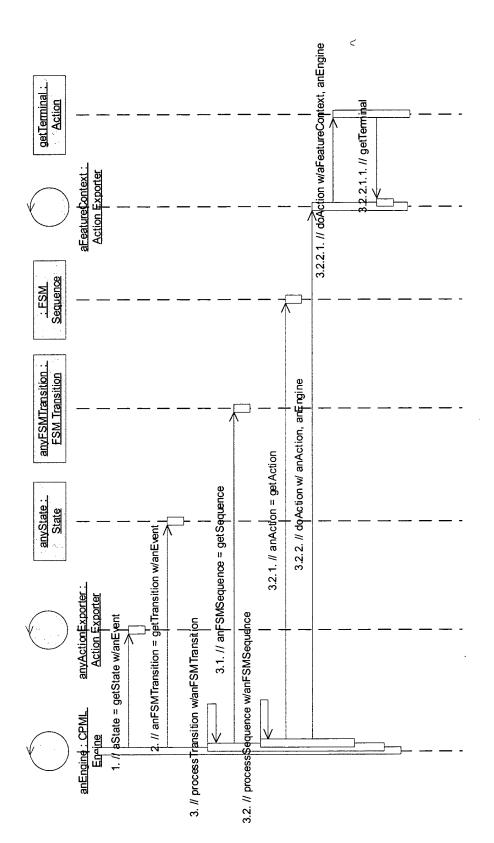
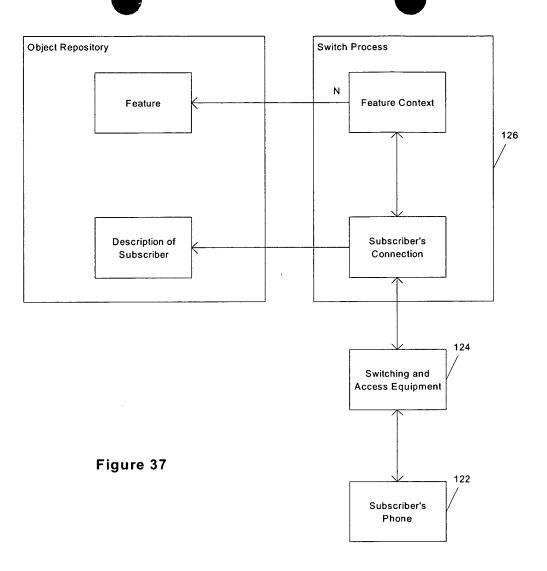


Figure 36B



## Example State Machine

<FSMSEQUENCE NextState="CALL\_AUTHORIZATION\_SVC\_END"> <LITERAL Name="EventLiteral" Value="Authorized"/> <END\_STATE Name="CALL\_AUTHORIZATION\_SVC\_END"/>
</FSM> <TRANSITION Name="T1\_1" Event="START"> <ACTION Name="postInternalEvent"> <IDOCTYPE LOGIC SYSTEM "fsm.dtd"> <LOGIC Name="CallAuthorizationSvc"> <FSM InitState="START"> <STATE Name="START"> </FSMSEQUENCE> <?xml version="1.0"?> </ACTION> </ACTIONS> </TRANSITION> <ACTIONS> </STATE>

**COPPERCOM** 

</r>

Figure 38

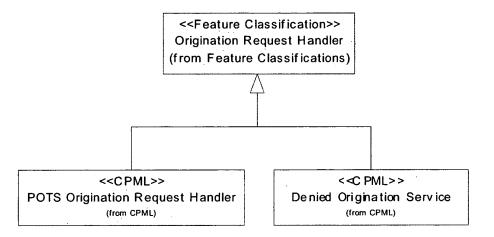


Figure 39

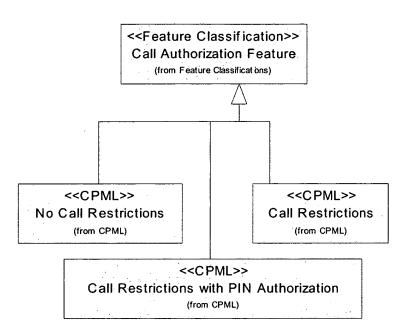


Figure 40

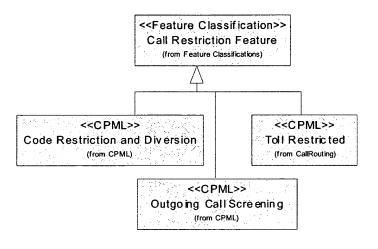


Figure 41

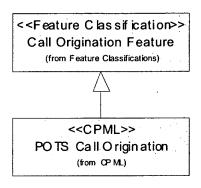


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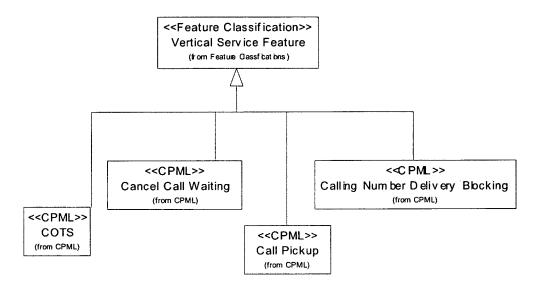


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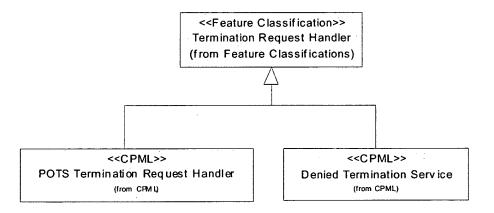


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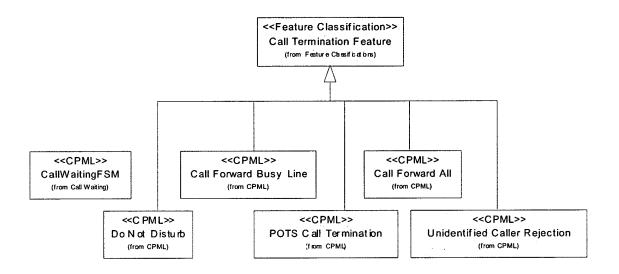


Figure 45

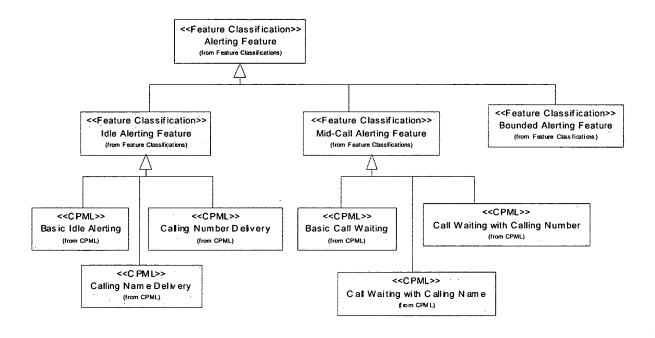


Figure 46

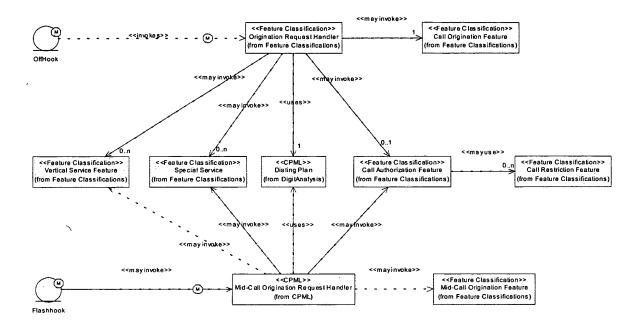


Figure 47

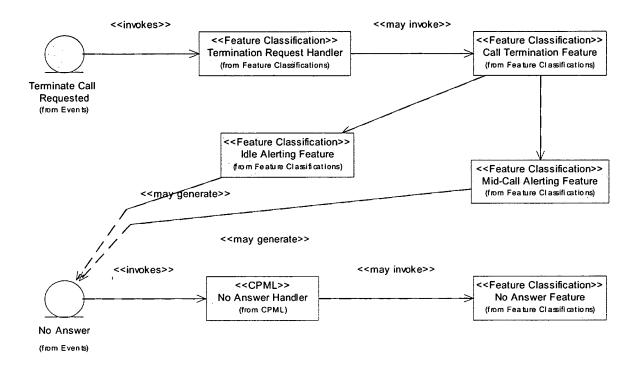


Figure 48

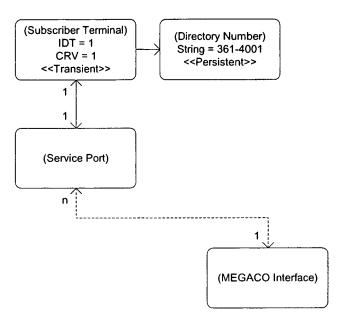


Figure 49A

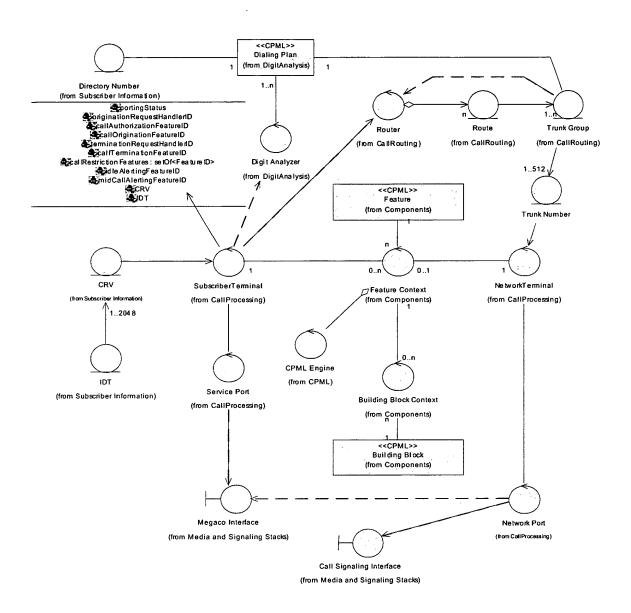


Figure 49B

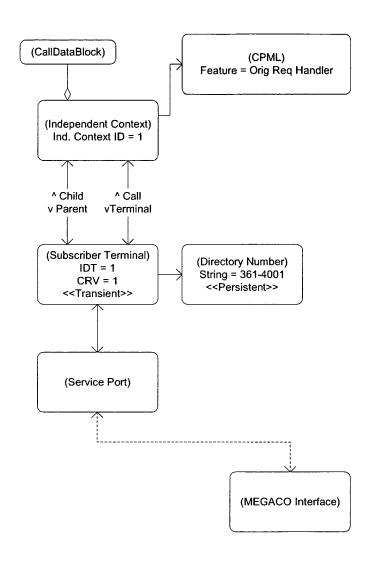


Figure 50

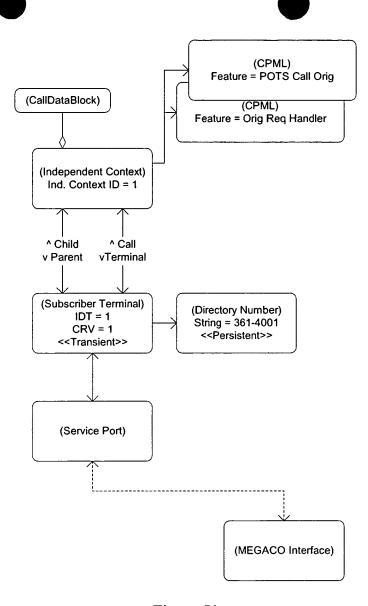


Figure 51

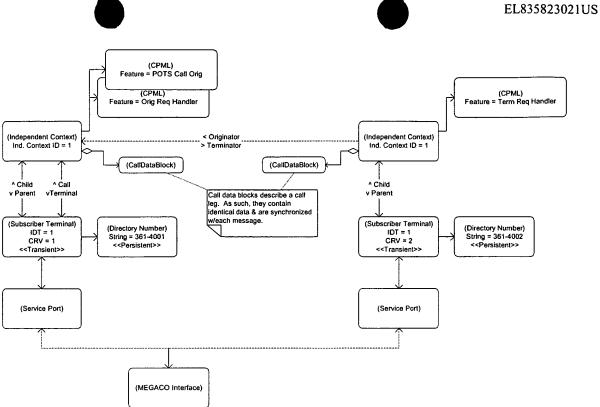


Figure 52

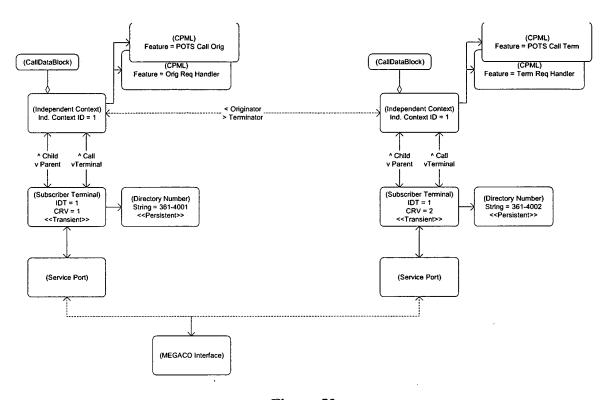


Figure 53

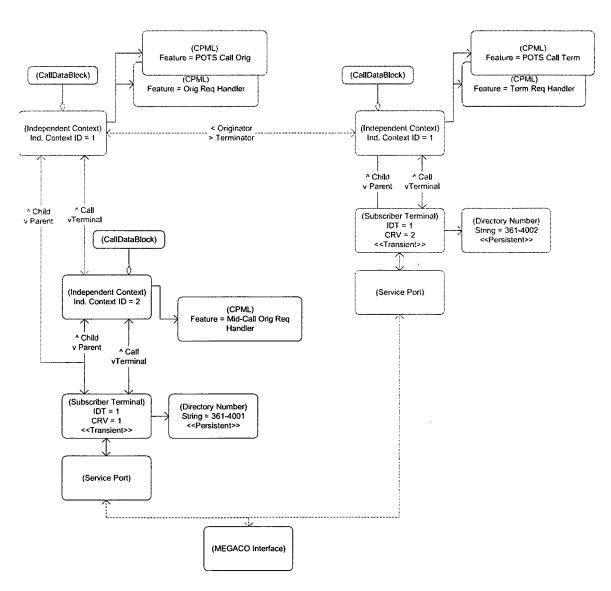


Figure 54

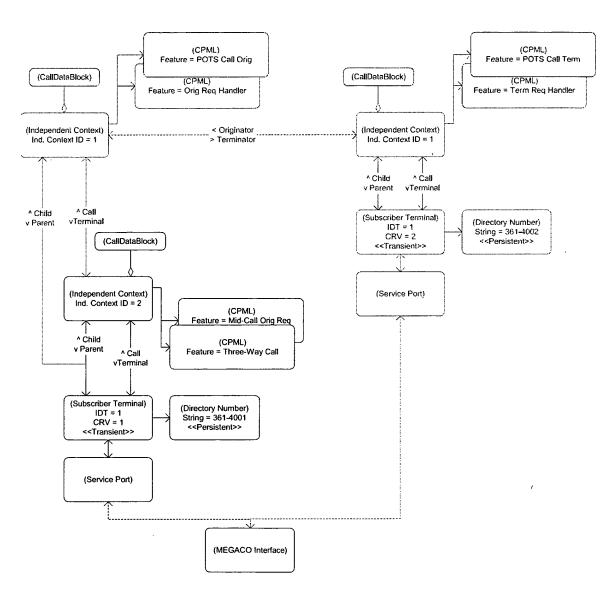


Figure 55

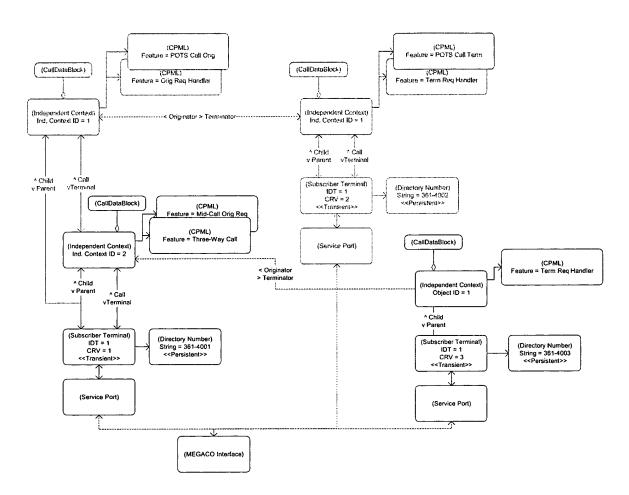


Figure 56

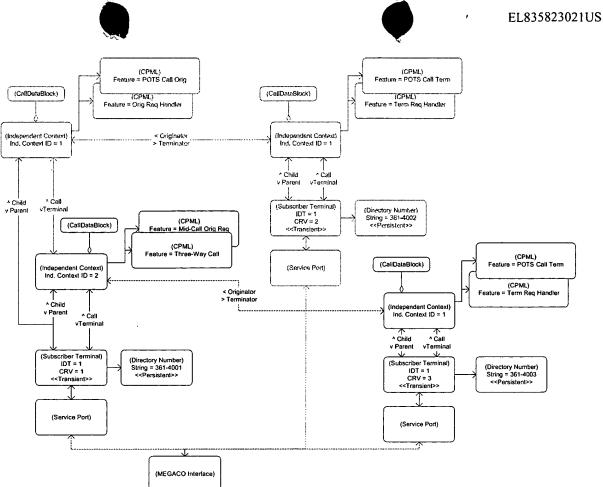


Figure 57



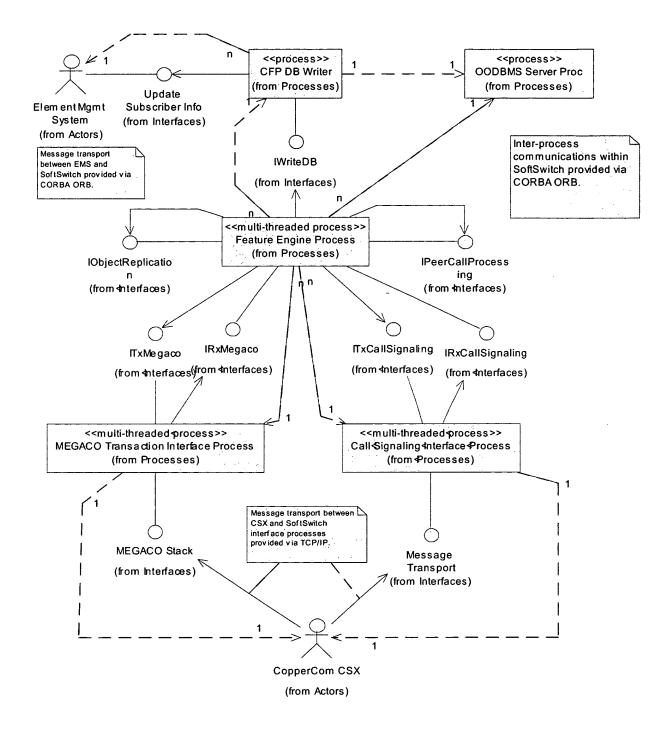


Figure 58